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Do political systems and ideologies neutralise private sector contributions to renewable energy in developing economies?

Introduction

The scope of this study is limited to the identified factors (economic, political, financial, and regulatory) that affect countries' renewable energy development, especially for a combination of emerging, frontier, and standalone markets across Asia, Africa, and South America (see the Morgan Stanley Capital International Classification, 2024). The frontline challenge remains that developing economies, especially selected emerging and frontier economies asides some high risers in the BRICS grouping (China and Brazil) are still behind in terms of the level of renewable energy in their energy mix. The pertinent question is: How can we scale up renewable energy adoption in the identified emerging and frontier economies to meet energy transition targets? Several authors have documented significant determinants of renewable energy that are not limited to a) economic and financial; b) environmental; c) political; d) regulatory; e) social; f) technical potential; g) institutional; and h) technological (see Aguirre & Ibikunle, 2014; Cadoret & Padovano, 2016; Sequeira & Santos, 2018; Sener et al. 2018; Zhao et al. 2019; Oryani et al. 2021; Muoneke et al. 2023). Sener et al. (2018) and Bourcet (2020) identified political and regulatory factors as barriers to renewable energy development in developing countries.

Highlighting political and regulatory factors resonates with the responsibility entrusted to central governments by acts of parliaments and statutes to oversee the actualisation of several development priorities, especially economic growth and environmental protection objectives (Muoneke et al. 2023a). Delving further into the political and regulatory landscape, some dire considerations precede the overall rationale for the topic under investigation. First, amidst economic-related challenges and the structure of selected emerging and frontier economies, can central governments of selected emerging and frontier economies bear the burden of renewable energy development single-handedly? Second, the existence of divergent political systems in the selected emerging and frontier economies opens new channels for truly understanding the connection between political architecture and the renewable energy development nexus. Third, all selected emerging and frontier economies under investigation across Asia, Africa, and South America scored below 50 on the 2023 Corruption Perceptions Index (CPI), indicating the presence of serious corruption problems in the selected countries (see Transparency International CPI report, 2023), along with the presence of low bureaucratic

quality compared to most advanced economies (see Guild, 2019; Urakami, 2023; Othman & Khallaf, 2023; Quadrat-Ullah 2024).

This study builds on the synergy established under the ecological modernisation theory (see Howes et al. 2010) to coin the concept of a supporting actor (primarily the organised private sector) to support central governments with resources to scale up renewable energy development. However, existing studies in this regard have focused solely on the relationship between public and private partnerships and renewable energy development (see Balza et al. 2020; Yahya and Rafiq, 2020; Liu et al. 2023; Balcilar et al. 2023; Raghutla and Kolati, 2023; Qamruzzaman and Karim, 2023). Despite efforts by Balza et al. (2020), Yahya and Rafiq (2020) and Liu et al. (2023) focused solely on private sector investment; the data utilised in their empirical analysis had strands of public investments, thereby complicating their findings. Furthermore, inconsistencies attached to public–private partnerships in most developing economies add credence to the idea of solely focusing on private sector investment in investigating the contributions of the private sector to renewable energy development (Hall, 2015).

Furthermore, after adopting a supporting actor congruent with ecological modernisation theory, how does the state of institutional quality measures (bureaucratic quality and corruption) influence the private sector's ability to contribute positively to renewable energy development in the selected emerging and frontier economies? Balan (2011), Li et al. (2019) and Przychodzen (2024) opined that institutional quality measures do not have an impact on isolation, as there are political undertones (differing political systems and ideologies) to the above-mentioned relationship, thereby necessitating the inclusion of the prevailing political architecture to test how the specified institutional quality measures (bureaucratic quality and corruption) affect private sector participation in renewable energy under the divergent political systems in the selected emerging and frontier economies. The state of academic literature on the political ideologies, systems, and renewable energy nexus is more skewed toward advanced economies (US, Europe, and OECD economies) (see Hess & Renner, 2019; Gustafson et al. 2020; Thonig et al. 2021; Czarnek et al. 2021; Lockwood & Lockwood, 2022; Otteni & Weisskircher, 2022; Tawiah, 2022). The findings deduced from the studies on advanced economies are not applicable to emerging economies' contexts because of differing political orientations (see Czarnek et al. 2021); hence, the motivation to narrow in the investigation of emerging and frontier economies to properly articulate their unique political architecture makes or mars private sector investment in renewable energy development.

The main research objectives after careful examination of the literature are a) to investigate the relationship between private sector investment and renewable energy in selected emerging and frontier economies; b) to unearth the effect of institutional quality measures (bureaucratic quality and corruption) on private sector investment under different political systems in selected emerging and frontier economies; and c) to identify the effects of political parties' peculiar ideologies on the private sector investment and renewable energy nexus in selected emerging and frontier economies.

Theoretical Orientation

The theoretical underpinning for this empirical adventure emanates from the ecological modernisation theory due to its in-built framework which allows for the exploration of the roles of different stakeholders (government, private sector, environmental NGOs, civil society, environmental activities, academia, and other non-state actors) in achieving desirable environmental outcomes (Howes et al. 2010; Glynn et al. 2017). Gibbs (2017) added that political institutions and processes can be modernised to tilt the direction of the economy towards environmental improvement. Across developed and emerging economies, the state and private sectors play active roles in the renewable energy market, with noticeable spectators not limited to environmental NGOs, civil society, environmental activists, the press, and academia. However, in some emerging and frontier economies, the state dominates the energy sector, and other countries adopt mixed private and public participation in the energy sector. Therefore, improving the environmental conditions of selected emerging and frontier economies depends on the entirety of the institutional structure without leaving the path of modernity and technological innovation (see Smith & Garza-Rubalcava, 2019).

Research Methods and Data Sources

The study sample was curated based on an appreciable level of economic growth, renewable resources potential, similar levels of institutional quality, divergent political systems, and varying political ideologies. The study sample comprises emerging and frontier economies in Asia, Africa, and South America. The period under investigation is 1990-2022, during where substantial time-series data will be collected from the World Development Indicators, Varieties of Democracy Project, and Political Risk Services Group. The datasets are publicly available, and the University Library provides paid access to subscription-based sources, especially the Political Risk Services Group. The study variables selected to answer research questions are renewable energy consumption (REN), private sector investment (PSI), bureaucratic quality

(BUR), corruption (CORR), political system (broad types) (PS) and political ideologies (PI). Table 1 provides a detailed description of the selected study variables

Table 1: **A table showing description, measurements and sources of data for chosen study variables**

Variables	Measurements	Sources	Model Positioning
REN (Renewable energy consumption)	Percentage of total final energy consumption	World Development Indicators	Dependent Variable
Private sector investment in energy (PSI)	Current US $ millions	World Development Indicators, World Bank Private Infrastructure and Refinitiv Database	Independent variable
Bureaucratic quality (BUR)	0-4 points	Political Risk Services Group	Independent variable
Corruption (CORR)	0-6 points	Political Risk Services Group	Independent variable
Political System (PS)	Political systems are divided into sub-types (democracy, autocracy or mixed for broad sub-types)	Varieties of Democracy Project	Independent variable
Political ideologies (PI)	Political ideologies are classified across the left, centre and right wing.	Database of Political Institutions	Independent variable

Source: Authors Computation

The resultant model stated in econometric form:

$$REN = \beta_0 + \beta_1 PSI + \beta_2 BUR + \beta_3 CORR + \beta_4 PS + \beta_5 PI + \mu \text{ ---------(eq. 1)}$$

The estimation technique utilised to provide robust estimates are Generalised Method of Moments (GMM), Instrumental Variable Fixed Effects and the Augmented Mean Group (AMG) for robustness checks.

Expected Findings

The expected findings are applicable to selected emerging and frontier economies across Asia, Africa, and South America. After estimating the study model in equation 1, the empirical results are expected to highlight the state of declining institutional quality measures in the selected countries and their negative impact on private sector investment and the renewable energy nexus. Furthermore, the direction of the effect might differ under the different political systems present in the selected emerging and frontier economies, as more autocratic systems might produce little or no significant effect compared to more democratic systems. The findings will be delineated at the country level which is advantageous to the body of knowledge and made possible by the small sample size of the six countries.

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